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FRONT COVER: "*Lakeland Church,*" *by A. D. Sharp (Alkali Division)*

OUR CONTRIBUTORS

W. F. OSBORNE *of 'Terylene' Council has been concerned with the development of 'Terylene' ever since I.C.I. started to work on this project at the beginning of* 1944. *Until then he had been working as an engineer in the Alkali Division. He is the member of 'Terylene' Council specially concerned with production.*

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'Terylene' Is Here

By W. F. Osborne (Member of 'Terylene' Council)

The 'Terylene' plant at Wilton in Yorkshire came into production at the beginning of this year. This was the culmination of eleven years of research and development by I.C.I. Here is a survey of this gigantic venture—once a laboratory experiment, then a pilot plant, and now a huge factory.

Interior colour photographs by Ivor Ashmore

THE recent statements in the press that the big I.C.I. 'Terylene' plant at Wilton had been completed according to schedule, and the increasing quantity of 'Terylene' goods appearing in the shops, must have made many people in I.C.I. wonder what 'Terylene' is, and why I.C.I. is making it. The answer to the first question is simple. 'Terylene' is a new textile raw material and a major British invention. It is produced and sold by I.C.I. in the form of silk-like filament yarn or cut staple fibre resembling wool or cotton. The articles appearing in the shops are made, therefore, not by I.C.I. but by its customers.

'Terylene' is not a substitute, but is a textile fibre in its own right. Possessing many of the attributes and properties of the natural fibres, it has also a combination of properties which has never before been encountered in a textile material. Although necessarily made in the forms in which the customer can use it, 'Terylene' is a pure chemical substance, synthesised from simple raw materials, and the plant at Wilton is essentially a chemical, and not a textile, plant. This answers the second question.

The costs of development have been very great, running into millions of pounds, and only a firm with the resources of I.C.I. could afford to carry out work on this scale.

'Terylene' is not, however, an I.C.I. invention. It was discovered in 1940 by Mr. J. R. Whinfield, C.B.E., assisted by Dr. J. T. Dickson, then both of the Calico Printers' Association. Apart from its great importance, the discovery was remarkable in its simplicity.

When, some years earlier, nylon was discovered in America by the late Dr. W. H. Carothers, some thousands of new materials were synthesised and critically examined. Whinfield's concept was confirmed by a single simple experiment. The discovery was not, however, the result of a lucky hit by an arrow shot at a venture. It was the culmination of several years' intelligent contemplation on the subject by a man busily engaged on other work. As an invention it was brilliant.

I.C.I.'s first contact with 'Terylene' came about in December 1943, when the Ministry of Supply, which

A SECTION OF THE 'TERYLENE' PLANT. *The tall building is where the polymer is made, and alongside is a block of offices. The 'Terylene' Plant covers* 30 *acres and will cost all told around £*11*m.*

had been interested in its possible use for wartime purposes, appealed to I.C.I. for assistance in its development. Earlier in that year I.C.I. had already decided that the time had come when it must start work in the important new field of synthetic fibres if it was to secure its rightful place in post-war chemical industry. Arrangements had therefore been made for Plastics Division to start work on spinning fibres.

The first work on 'Terylene,' however, was carried out by Dyestuffs Division at Blackley on small quantities of polymer obtained from the Central Chemical Laboratory at Teddington. This work eventually led to an agreement being reached with the Calico Printers' Association for the development, production and sale of 'Terylene,' I.C.I. being granted world-wide exclusive rights except for America, where the rights had already been obtained by E. I. Du Pont de Nemours, the originators of nylon.

Exceptional Purity

The problem now confronting I.C.I. was the economic large-scale production of an entirely new chemical material in an exceptionally high degree of purity—higher, for instance, than that demanded by pharmaceutical standards. Furthermore, one of the main constituents, terephthalic acid, from which 'Terylene' in part derives its name, was a most intractable material which had never before been made on an industrial scale, and its purification to the standard required was likely to be extremely difficult.

However, these two I.C.I. Divisions, Dyestuffs and Plastics, carried the development along at an ever-increasing pace as fast as wartime and post-war restrictions on man-power and machinery supplies would allow, working together in close liaison and using improvisation where necessary, Dyestuffs making the polymer and Plastics converting to fibre. Later a third Division, Billingham, joined in to work on the development of a novel process for the production of *para*xylene, from which terephthalic acid is made by oxidation. The other main starting material, ethylene glycol, is derived from the products of the olefine plant on the Wilton site.

Glycol was, of course, already being made on a large scale by I.C.I., but a great amount of development work had to be done by Billingham Division before the new *para*xylene plant on the Wilton site could be designed and constructed. This plant, like the main 'Terylene' plant, has likewise been completed on schedule. Secondary raw materials, of which large quantities are consumed, are nitric and sulphuric acids and methanol, all of which are made by I.C.I. at Billingham or Wilton.

Having decided on the best way to make 'Terylene,' I.C.I. had next to confirm, by large-scale trials in the textile industry, that the material was as good as the early laboratory evaluation had indicated it to be. For this purpose large quantities would have to be made available, and the quality would have to be high and, above all, uniform. Decisions were taken to build plants within the Huddersfield and Hillhouse factories for pioneer production of polymer and fibre respectively. These were brought into operation towards the end of 1949 and have since operated continuously in producing 'Terylene' filament yarn and cut staple fibre for trials by the textile industry.

This has resulted in considerable quantities of made-up textile apparel and household goods being sold in shops to the general public—the final arbiter of quality—and in ropes, cords, sewing threads, fishing nets, laundry bags, filter cloths, electrical fabrics, papermakers' felts, fire hose and similar goods being sold for industrial use.

Ever-present Dilemma

In spite of the ever-present conflict between the demands of production for sale, which require continuity, and the needs of development, which usually result in change, processes were established and data provided for the design of the large-scale plant at Wilton. These processes had to be "frozen" (except for minor change) by about mid-1952 to allow construction at Wilton to proceed. Since then both pioneer plants have operated at ever-increasing rates of output, not only keeping the customer sweet—and we must not overlook the substantial contributions made by various textile firms—but also testing out thoroughly the processes to be used at Wilton.

Much responsibility has thus rested on those operating the pioneer plants at Huddersfield and Hillhouse, and the smooth functioning of the main plant at Wilton will be due largely to their efforts over the difficult years. Meanwhile they continue jointly to make no small contribution to the 'Terylene' project: last year's pioneer production, and therefore sales, were close to two million pounds.

The main 'Terylene' plant at Wilton is now operating in every section, but time will be required to bring it on to full steam. At every stage quality considerations control the rate of progress, chemical

(*Continued on page 142*)

THE HEART OF THE POLYMER-MAKING PROCESS. *The polymer is the chemical which when melted and forced through the spinneret becomes 'Terylene' yarn. In these huge vessels the last of many stages in making polymer is about to take place. A man turns a valve to let the raw material from the vessel above into the polymer autoclave at floor level.*

One man and his job—30

THE BLACKSMITH

In all his forty years as a blacksmith John Archibald has never shod a horse. That, I was told gently, is not surprising, since shoeing is not a blacksmith's job at all, but a farrier's. With one fond illusion shattered, I was less shaken by the other ways in which Mr. Archibald differed from the traditional idea of a blacksmith. No one, for instance, could describe him as a mighty man, and his anvil stands in surroundings singularly unlike a village green.

He is one of six blacksmiths at the Ardeer factory of Nobel Division. They spend their days in a big communal workshop, noisy with incessant hammering and warmed with the glow of half a dozen crackling coke fires.

The setting, I thought, exemplified the mixture of age-old traditions and modern techniques which the blacksmith of today must master. Mr. Archibald's share of the floor space was dominated by the familiar tools of his trade—an anvil, a hooded hearth, a rack of hammers and tongs. But the fire burned with suspicious steadiness, and I detected an electric motor co-operating to produce a draught, while near at hand a powerful forging hammer stood ready to help with the heaviest jobs.

Mr. Archibald told me that all the blacksmiths were trained to use this mechanical hammer, and added with commendable fairness that sometimes it did work no amount of human effort could achieve. "But of course," he went on, "there's not the satisfaction in it that there is in a hand-made job."

As I watched him at work I felt I could understand this. He and his mate, William Paxton (the two met first, incidentally, in apprentice days in the shipyards), were making couplings for railway trucks—a job which, for all its apparent simplicity, demonstrated to a nicety the art and craft of the blacksmith. Making sure that the fire was burning bright and clear—a very important point, this—Mr. Archibald thrust into its heart a small bundle of steel rods about two feet long and an inch across. Leaving them to heat up, he prepared the anvil by inserting a steel jig in a convenient hole in its anatomy. The jig consisted of a cylindrical block (variously described as a former, a fork or a devil) and an adjacent peg. Mr. Paxton stood by holding a long iron bar with a grooved end.

Satisfied that the almost white-hot rods were at the right temperature, Mr. Archibald picked one out of the fire in a pair of tongs and slipped it neatly between the former and the peg, sparing one hand to whip out a rule and check positions. The purpose of Mr. Paxton's implement now became apparent—it was to act as a second pair of tongs. Working together with the speed and dexterity of long practice, blacksmith and mate curved the rod gently round the former, and hey presto! There was one U-shaped end of the coupling.

An onlooker might have been excused for thinking that this looked simple, almost mechanical. The second stage was more obviously specialised.

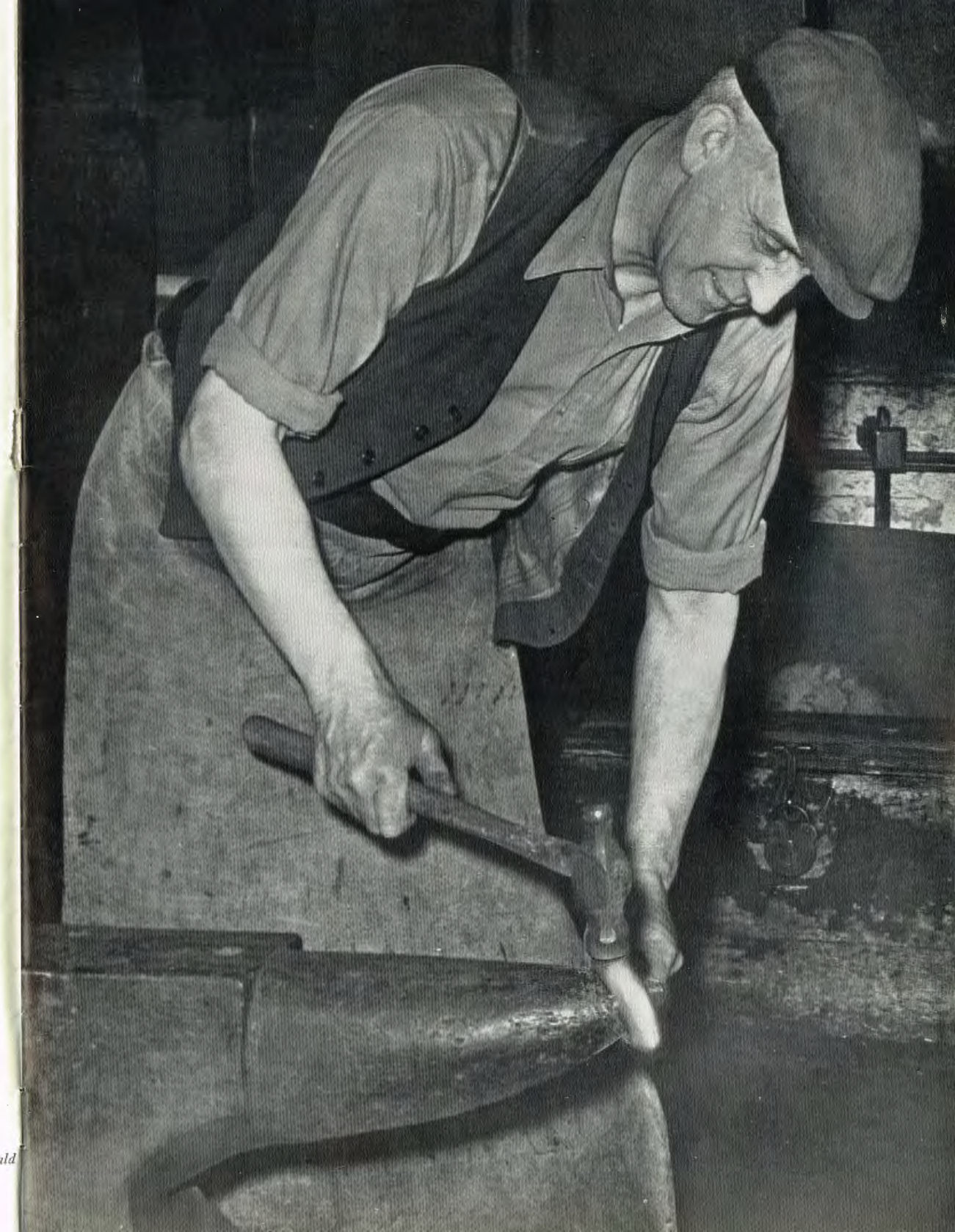
Mr. Archibald heated the embryo coupling again and, holding the rounded end steady on the anvil, began a systematic belabouring with an impressive variety of hammers. A few sharp blows produced a spectacular shower of sparks and turned the straight ends inwards; hooked over the pointed toe of the anvil, these were swiftly knocked together to form a somewhat bulbous half-circle. With a quickness of hand which all but deceived the eye, Mr. Archibald then tidied up the rough edges, chipping and smoothing the still-malleable steel for all the world like a dentist finishing off a filling. In something under two minutes the U had become an elongated O and the coupling was ready for its last ordeal in the burning fiery furnace.

As the pile of finished couplings grew, it occurred to me that a blacksmith has much in common with a carpenter. Both learn to recognise by sight and touch what their material will and will not do, when to persuade and when to humour it; both enjoy the privilege of creating something new with their own hands and the equally satisfying work of repair and restoration; both know how vital it is to have the right tools for every purpose and to use them as naturally as an extra set of fingers.

The blacksmith has one advantage over his fellow craftsman, though, for he makes the tools himself. Mr. Archibald showed me the collection he had built up during his twenty years at Ardeer—hammers, mallets, gauges and tongs in dozens of different shapes, weights and sizes.

I asked if Mr. Archibald had followed in father's footsteps in choosing his trade. "No," he said, "in my grandfather's. And funnily enough, though neither of my sons is a blacksmith, my grandson is quite keen on the idea." Well versed by this time in Ardeer's tradition of family service, I hazarded a guess that the third generation too was represented on the I.C.I. payroll. "Not yet," was the answer: "he's only five!"

D.B.T.



John Archibald

Information Notes

TOP MANAGEMENT AND EFFICIENCY

By Alexander Fleck (Chairman of I.C.I.)

The duties of top management—in other words, of the executive directors of a company—were outlined by Dr. Fleck in a recent address to the West of Scotland Management Association. Dr. Fleck's talk (of which a shortened version is here published) sets out clearly and on a note of original thinking in what manner the fortunes of any company are bound up with the judgment and ability of the men at the top.

I WOULD like to suggest to you (said Dr. Fleck) that the main duties of top management can be resolved into five groups. The first is the general leadership of the company, the second is the selection and appointment of staff, the third is the determination of the future course of the company, the fourth is the use of capital, and fifthly there are the external relations of the company. I should like now to consider each of these five duties in turn.

If a company is to run efficiently, top management must realise that they are the leaders of the organisation, and as such certain things are expected of them. They have to inspire the organisation.

If top management do not show themselves to be confident in the future of their company, then they cannot expect those down the line to be so. If they do not engender an air of keenness and enthusiasm, they cannot expect those qualities from their subordinates. Every organisation requires a final fount of authority to which, in the last resort, anyone within the organisation can appeal for decisions and adjudication. It is a prime duty of top management to accept such responsibility. There are moments in the affairs of any company when clear orders have to be given.

It is top management's task to give those orders and not to feel ashamed about giving them.

In my opinion there is too much talk these days about institutionalising management and trying to run everything by rules. A good organisation can help you to make the most of the people you have got working with you, but it cannot do more than that; it cannot add qualities to people which are not there.

Top management must never allow themselves to become the slaves of their own organisation. They create the organisation, so they are entitled to change it whenever they feel the occasion warrants it. Remember that in setting up a particular form of organisation we determine not only the functions but also the amount of authority which we allow our subordinates. In allocating authority we try to anticipate the sort of problems which our subordinates are likely to have to face and to arm them with sufficient authority to carry out their normal duties but beyond which they are fettered. Then the unusual happens and the subordinate manager finds that there is no school solution and in any case his own terms of reference do not cover the situation.

The one group in the company which has the authority and is free to use it is top management. So they must be prepared to break their own rules when they feel the circumstances warrant it.

Generally speaking, top management should concern itself with the future of the company rather more than with the present. Hence the task of top management is to direct rather than to manage, by which I mean the formation of policy and overall control. It is the task of subordinate management to run the day-to-day affairs of the company within the framework of the general policy laid down by top management. The day-to-day management of the company is a big task which requires competent men.

This brings me to the second duty of top management—the selection and appointment of staff. I believe that one of the most important contributions which top management make to the efficiency of their company is the correct selection of people to fill the senior appointments of the company.

Top management must make the main appointments in the company, but at the same time they must not breathe down the necks of their immediate subordinates by themselves making the appointments too far down the line. None the less they should keep a weather eye open for talent down the line and try to encourage it. In some companies the directors complain that they are short of talent and do not know how to fill their senior appointments, while down the line there are a lot of able young men bored and frustrated because middle management will not give them a chance to come through and because top management does not even know of their existence.

I think we all agree that initiative is essential to efficiency. In the main, the habit of initiative is developed by the example which top management sets. If we as top management complain of the lack of initiative down the line, we may well find, like Cassius, that the fault is not in our stars but in ourselves.

. . . visualise future conditions

Top management should concern itself with strategy and not with tactics. This means that the majority of their time will be spent on considering future rather than present problems which can be taken down the line—where the company is going, what are its long-term objectives, and how it intends getting there.

To be able to visualise future conditions it has become increasingly necessary to have a sound grasp of technological change. Science is developing so rapidly that the basic technical conditions of an industry are changing at a remarkable rate.

A good example is the American chemical industry, where 40% of the products sold in 1951 did not exist in 1936. Or take the metals trade. Until the sixteenth century man had known how to use only seven metals—gold, silver, copper, tin, iron, lead and mercury. In the next three centuries he added seven more—antimony, zinc, bismuth, arsenic, nickel, cobalt and manganese. But since 1900 the number of metals in use has more than trebled. The thinking of metal manufacturers and metal traders has had to be recast in terms of chromium, tungsten, aluminium, magnesium, molybdenum, silicon, sodium and titanium, and who knows what is yet to be discovered ? Top management must not only be aware of such technological changes: they must actively seek them.

Research is obviously the principal source of new ideas, so that clearly top management have a duty to encourage research.

Personally, I regard an industrial company which takes no interest in research as being without the means of its own preservation. Top management must do something more than encourage research: they must direct research so that it fits into the pattern of the company's future. We must remember that, unlike academic research, most industrial research has a utilitarian end—namely the discovery of new products or the improvement of existing products and processes. Furthermore, discovery in the laboratory is only the beginning of a chain of events. The work of development and application is often more difficult and usually more expensive than the original research.

Research cannot be left to run itself. Too much is at stake. It requires inspired direction from the top, which I may add is quite different from detailed interference.

The fourth duty of top management is the use of capital, which is only the practical application of their third duty of looking to the future. In determining how to deploy their available capital top management lay down the future lines along which their company will run. Since mistakes in the expenditure of capital are usually irrevocable—or at best difficult to change—the effectiveness with which capital is deployed is basic to industrial efficiency.

I hold that in modern industry an important factor is the productivity of capital. As a recent article in the *Harvard Business Review* put it, "the basic measure of economic worth is the productivity of capital, which means its power to produce profits."

We talk a lot nowadays about increasing the level of productivity. We have work study and incentive schemes. We study stocks and evolve new methods of stock control. We have to devise all sorts of ideas for increasing production. All of which are very useful: but compared with the proper management of capital they have only a marginal influence on overall efficiency. In my industry it is quite common to average £10,000 capital investment behind each process worker: it is not unusual for the figure to rise to several times this. Where industries have to carry investment on this scale, the productivity of capital is inevitably an important consideration in industrial efficiency.

The fifth set of duties concern a company's external relations. First there are those relations which directly affect a company's business and thereby its efficiency. I would mention but three—relations with the trade unions, relations with its trade associations, and relations with the government. I need not elaborate to you how bad relations with any of these groups could prejudice seriously a company's position.

THE STOCK EXCHANGE

By W. H. Ballard (Southern Region)

This summer, within four weeks of the annual general meeting, the I.C.I. Profit Sharing Scheme comes into operation. Bonuses will be placed in the hands of trustees, who will use the money to take up I.C.I. ordinary stock. The price of I.C.I. stock becomes, therefore, of special interest to us all. Here is a simple account of the forces which govern the price of stocks and shares and of how the Stock Exchange is organised.

"WHAT are chemical?" "Six nine." "Anything else?" "How many are you?" "Five hundred." "Well, six seven and a half." "Buy five hundred."

This rather strange, disjointed conversation is typical stock exchange language. It means that a broker has approached a jobber and enquired the price of I.C.I. ordinary stock. The jobber quotes 40s. 6d. to 40s. 9d., but the broker wishes to deal inside these prices. On learning that the broker wants to deal in 500 and it suits his "book" to do so, the jobber quotes 40s. 6d. to 40s. 7½d. The broker then buys £500 I.C.I. ordinary stock at 40s. 7½d. for his client.

Every year hundreds of thousands of "bargains" are executed just as simply between brokers and jobbers. No written contract passes between them; they each make a pencil note of the bargain, and the following morning these bargains are checked by the stockbrokers' and stockjobbers' clerks in the settling room of the stock exchange, and that completes the deal except for the considerable amount of clerical work involved in the settlement of transactions and registration of the stock or share. Disputes over bargains are very rare.

In short, everyday life of the stock exchange is carried on today as always in the spirit of the stock exchange motto "*Dictum Meum Pactum*"—my word my bond.

The stock exchange, like any other exchange, merely registers supply and demand translated into prices at which buying and selling take place—in this case, stocks and shares in which the council of the stock exchange have granted permission to deal. Before the shares of any enterprise can be dealt in on the exchange this permission must be obtained, and it is only granted after the fulfilment of certain strict conditions.

The members of the stock exchange, whose activities are controlled by rules and regulations drawn up by the council, are divided into two groups: stockbrokers, who act as the agents of the public and transact business on its behalf; and stockjobbers, whose function it is to "make a price" in any stock or share which they elect to deal in to a broker or fellow jobber.

There are approximately 3600 members, and a large percentage of these, together with their authorised (dealer) and unauthorised clerks, assemble daily for the purpose of transacting business on the floor of the "House." A considerable number of the members are recruited from the ranks of these clerks, and under the rules they can after four years' service become candidates for admission to membership on more favourable terms than a person applying without any previous stock exchange experience. There is plenty of scope for advancement in this profession for the young man with ability. Many a successful stockbroker and stockjobber has started his career as an office boy running round the city delivering contract notes and stock.

In the past the stock exchange has been a place of mystery to the layman. Over the entrances to the exchange there is a notice, "Subscribers only admitted." This rule is strictly adhered to except on special occasions when distinguished guests are sedately conducted through the "House" by members of the council.

Occasionally strangers do succeed in slipping past the scrutiny of the doorkeeper—called, by ancient custom, a waiter—but they do not get very far. They usually give themselves away by their evident unfamiliarity with the scene. Discovery is followed by the cry of "Fourteen hundred!" The stranger is at once spotted, and is conducted out of the "House" in a manner which is not always as gentle as it might be. The origin of the expression "fourteen hundred" is lost in antiquity, but it is generally supposed to date from the time when membership was one short of that number and the fourteen hundredth was therefore an outsider.

Until recently very little publicity has been given to the stock exchange and its functions. The governing body, the stock exchange council, has now revised its attitude. In 1953 a gallery was opened in the "House" where the public can go and watch business being transacted on the exchange, and a very lucid and informative booklet describing its activities is available. This has shed some light on the mysteries of this very necessary institution; it may also have helped to dispel the ridiculous notion that booming markets are engineered by rapacious individuals, resulting in fortunes being made overnight.

The pattern of business on the stock exchange has changed since the war. Gone are the big operators. The buyers and sellers who put most of the big business into the stock market today are the banks and insurance companies, who have to invest and deal with the millions of pounds which they receive from and pay to their depositors and policyholders. The large pension funds also have considerable sums to invest each year, I.C.I. pension funds alone having approximately £6,500,000 annually to invest.

The Stock Exchange in action—a view from the public gallery (Picture Post *Library*)

Many of these funds flow into gilt-edged stock (government securities) and blue chips (first-class industrials), and to a great extent the firmness of these markets in recent months can in part be attributed to this steady demand. Nevertheless the values of stocks and shares quoted on the stock exchange are subject to fluctuations dependent on general day-to-day conditions, such as the bank rate, present and future prospects of industry, and the supply and demand of any particular stock. Current price quotations are really a barometer of public and commercial opinion, reflecting with reasonable accuracy the consensus of opinion as to the value and prospects of companies and the future trend of interest rates as they affect government stocks and other fixed interest bearing securities.

The London stock exchange, together with the provincial and associated exchanges, gives a valuable service to the community in that it provides a ready market in stocks and shares, and through its machinery can and does assist the government and industry in raising capital in different forms.

'TERYLENE' IS HERE (*continued from page* 145)

number of yarn uses further twist has to be inserted. This is usually done by the customer, but for sale overseas, where suitable throwing capacity, as it is called, is limited, thrown yarn is made by I.C.I. using conventional textile machinery.

It will be seen that the number of filaments in a yarn is determined by the number of holes in the spinnerets. For the production of staple fibre the number of holes per spinneret is greatly increased, and the yarn becomes a tow. By a series of multiplying operations large tows are built up and drawn as a rope over large drawframes, being subsequently crimped, heat-set and cut to the requisite length. The final product is then baled for despatch to customers. Accuracy of cut is of vital importance. Thickness, extent of crimp, length and physical properties can be varied to suit processing on cotton, wool, worsted, flax or spun silk systems.

The plant just completed at Wilton has a designed capacity of 5000 tons per annum of 'Terylene,' in roughly equal proportions of filament yarn on bobbin and staple fibre in bale. A 100% extension, raising potential output to 10,000 tons per annum, will be completed early in 1956, and further large extensions are being planned.

This raises the third question that the I.C.I. observer may ask—What will be the effect on cotton and wool? In answering this question one must observe a sense of proportion. Annual wool consumption in this country is of the order of 500 million pounds and cotton 1000 million pounds. Against these huge figures the projected 'Terylene' output of say 22 million pounds is small. World demand is increasing rapidly as living standards rise and world population increases, and although textile supply has in the past half-century been greatly increased by the production of huge quantities of rayon, there has been no falling away at all in the demands for wool and cotton. Only silk has fallen by the wayside.

The effect of the introduction of 'Terylene' and other synthetic fibres, such as nylon, is therefore not to displace existing fibres but to enrich the life of the community. In doing so it will benefit I.C.I. and, with it, this country.

Garden Notes

By Philip Harvey

Illustrated by Susan Einzig

INSECT pests are really on the move this month, and you should be on your guard against various potential enemies. There is no need to get into a panic and spray everything in the garden indiscriminately, but it does pay to take immediate action directly the first signs of damage are detected, as this prevents a build-up. In gardens and allotments pest number one is unquestionably greenfly, blackfly, etc., known collectively as aphids. They are more abundant during hot, dry spells; cold winds and cool weather, especially heavy rains, are deterrents.

Aphids are the most important pests of roses and some species may be found on the trees throughout the year, particularly in sheltered positions. Spring, early summer and early autumn are the peak periods of attack. Their rate of reproduction is extraordinarily high though they have many natural enemies, including ladybirds, hover flies, tits, sparrows and various birds.

We are told that plants would be completely overwhelmed by aphids unless the latter were kept down by beneficial insects and birds. As far as roses go this seems a little difficult to credit, since, despite careful observation, I have never noticed any great number of ladybirds and the like on my rose trees. In many cases they seem to appear comparatively late in the season, when most of the damage has been done.

Aphid attacks lead to a general reduction in vigour, including bud drop. You can often notice them clustered on the shoots of ramblers and climbers in May. Bush roses sometimes escape until early June. Though certain rose varieties show varying degrees of resistance to diseases like black spot and mildew, there is no similar reaction to insect pests. A weakly, undernourished rose is, in theory, more liable to attack than a plant of normal vigour, but in my experience this point is of no practical importance. Spraying both sides of the foliage with 'Sybol' is the most up-to-date remedy, being cheaper and more persistent than spraying with older materials like derris and nicotine. But you must spray in good time, especially when hot, sunny weather seems likely to continue.

Caterpillars can rapidly defoliate a brassica crop, but on rose trees they are seldom a serious pest. I have usually found hand-picking sufficient, but if this seems impracticable, 'Sybol' or a DDT spray will soon eliminate caterpillars.

Do not forget to earth up your potatoes. Even a few degrees of frost will injure the young shoots, and a late spring frost cannot be ruled out until May is over. Earthing up has several advantages. As already mentioned, it protects the potatoes from frost damage. At the same time it keeps the haulm upright and guards against blight infection. Before earthing up, make certain that the soil is dry and thoroughly broken up to a reasonably good tilth. Wet, lumpy soil is impossible to manœuvre. Earth up with a draw hoe when the haulm is about 9 in. high. It is best to draw up about 6 in. of soil.

Runner beans should be sown about mid-May. Earlier sowings are very risky, as they are unusually tender. A sunny position is essential, similarly deeply worked soil with plenty of body in it. You can, of course, grow this crop on practically any soil, but to secure long, well-filled pods you must dig in generous quantities of farmyard manure or compost. Sow in a double row at 9 in. apart in a 2 in. deep, 15 in. wide drill. Too-thick sowings can cause complications when staking. The seeds in each row should be opposite one another, as this makes staking easier.

If you have room for two or more double rows, allow about 7 ft. in between. With my tongue in my cheek I add that you should (or so the textbooks say) intercrop with lettuces or spinach. Only under strong domestic pressure will I grow the tasteless lettuce or the supposedly health-giving spinach with a flavour suggestive of soot. The comparison is not mine, but it seems very apt. Runner beans should be grown up 8 ft. bean poles and the growing points nipped out when they reach the top. If you are lazy and cannot be bothered to go through all the business of fixing the supports, you can adopt the practice of pinching out the growing points when the seedlings are 12 in. high, repeating the operation again as necessary until the ground is covered with the plants. This avoids any staking, but the crops suffer in quality and quantity, the beans often coming a distorted shape.

Plant your early-flowering chrysanthemums this month. The exact date is, of course, unimportant, though it is wise to wait until the second half of May in the north and Scotland. Any open, sunny position is suitable, provided the ground has been previously dug not less than one spit and enriched with compost, hop manure or farmyard manure.

Many gardeners plant their chrysanthemums in vacant spaces in borders about 15 in. apart. If you can spare the room to grow chrysanthemums by themselves, set them out in rows, again allowing 15 in. between individual plants. Never plant too deeply, as on heavy soils especially the roots may decay in very wet weather. Staking is always advisable, otherwise strong winds may cause the stems to break.

THE LIQUID POLYMER BECOMES A SOLID. *Cast on to a large cooling drum, it solidifies as a ribbon of plastic, which is then cut into small chips. After blending, the chips are conveyed pneumatically to the spinning plant.*

(*Continued from page* 133)

'TERYLENE' CHIPS STORED IN SPECIAL CONTAINERS. *These can be moved as desired along the overhead runway. Spaced along the floor are the melt heads above the spinnerets, and into these the containers are discharged as required.*

A WORM'S-EYE VIEW OF TWO SPINNERETS—*plates pierced with tiny holes through which the molten polymer is forced. Each jet, so fine that it is scarcely visible, hardens in mid-air into a filament.*

THE NEXT STAGE AFTER THE SPINNERET. *The continuous filament is collected together by being wound on to bobbins preparatory to stretching the yarn to make it stronger.*

THE FINISHED YARN, *drawn and rewound on to bobbins, is rigorously inspected for blemishes. An extremely high standard of quality—one might almost say perfection—is aimed at.*

A STAGE IN THE MAKING OF 'TERYLENE' STAPLE, *i.e. yarn cut into short lengths for the manufacture of woollen and worsted type fabrics. The yarn is stored in large cans and is fed from these to machines which crimp and cut it into staple.*

purity being essential to ensure the correct degree of uniform whiteness and to avoid trouble in subsequent processing by the textile user. In building up production, considerations of quality must ever predominate.

The plant is divided into two main sections, referred to as areas. They are the Polymer Area—which includes intermediates starting from *para*xylene—and the Fibres Area, where the polymer chip is converted to filament yarn or staple fibre. The Polymer Area is equipped with plant easily recognisable by most people in I.C.I.—pipelines, tanks, pressure vessels and stills, much of which is in stainless steel. The Fibres Area, on the other hand, is equipped with machinery that in the main is radically new, having been invented or developed by I.C.I and proved at the pioneer plants. Scrupulous cleanliness in all sections of the plant is essential, and in the Fibres Area the air in the operating sections of the plants is kept at controlled humidity and temperature.

The various steps in the manufacture of intermediates and polymer are perhaps too involved for inclusion in an article such as this. It may suffice to say that *para*xylene and ethylene glycol, the two main starting materials, both of which are liquids, finish up as 'Terylene' polymer, which is a hard, tough white solid. For convenience it is diced to cubes about $\frac{3}{16}$ in. in size, and is air-conveyed by pipeline to the Fibres Building, where it is dried and charged to the spinning heads. All spinning operations are carried out in an atmosphere of pure dry nitrogen, since in the molten condition 'Terylene' polymer is very sensitive to the effects of oxygen and of water, both of which bring about colour degradation.

The polymer is melted in the spinning heads and is forced out under high pressure (usually about 4000 lb. per square inch) through spinnerets, which are steel plates perforated with fine holes. On emerging from the spinnerets the streams of molten polymer freeze into filaments, which, combined as a yarn, are wound off on to bobbins.

At this stage the yarn is plastic, that is to say it will lengthen under light load. By drawing it out under carefully controlled temperature conditions in a separate operation an end point is reached where the yarn becomes elastic, requiring a considerable force to stretch it further and reverting to the original length on the release of load. During this separate drawing operation a low degree of twist is inserted in the yarn to keep the filaments which comprise it from separating. For a large

(*Continued on page 139*)

RADIO HAM

By A. R. Donald (Billingham Division)

The amateur short-wave radio transmitter is a post-war phenomenon born of enterprise and individuality. Here an enthusiast tells of the pleasures of this unique hobby.

To be able to sit back in the comfort of your own home and talk to the world—that, to my mind, is the fascination of operating an amateur radio transmitting station.

To some hams* (as we call ourselves) the fascination lies in the purely technical problems of transmitting and receiving over vast distances with home-made equipment. To me—although my home-made station has been in existence for quite a few years—there is still a thrill in hearing a fellow ham in Florida describe the sunlit scene outside his window while outside mine a real winter storm is brewing in the darkness. Ten minutes later I may be swopping news with a ham in Delhi and by the end of the evening have made contact with New York, the Persian Gulf, Toronto, Boston, Jugoslavia, Italy and France.

My interest in amateur radio came about more or less by chance. On my ordinary set I used to listen to the traffic on the short-wave bands—police, shipping and aircraft, for example. Sometimes I was lucky enough to catch freak receptions from as far away as Buenos Aires. I remember hearing nearly the whole of the broadcast of the Reichstag fire trial in 1933.

From this I turned to systematic listening with a proper short-wave receiver. Hams are always glad to get news of how their transmissions are being received, and soon I was sending out printed cards to hams all over the world on which I summarised the quality of their signals.

It was not long before I was dissatisfied with playing such a passive part in the game. (Some people, strangely enough, *are* content to listen: Mr. E. W. Trebilcock of Tasmania has listened to 76,000 ham broadcasts since 1926 and never broadcast a syllable himself.) I built myself a transmitter for approximately £10 and began to operate as station G3TO, duly licensed by the G.P.O. (I rebuilt my transmitter after the war, using war-surplus equipment costing about £75.)

Hams always confirm conversations they have had by exchanging printed postcards, called QSL cards, which carry data about their own station and remarks about the reception. On these cards they use a code which makes for brevity and ease of understanding: TNX means "thanks," for example; HPE is "hope"; HV is "have"; 73 is "best wishes"; XYL (ex-young-lady) is "wife"; OM is "old man"; QSO is "transmission." "TNX for nice solid QSO, Bob" is typical of the postscripts on the cards I receive.

Looking back through my pre-war album of these cards brings back strange memories. I find one from a German ham in Leipzig bearing a photograph of him at his transmitter and a picture of Hitler prominently displayed in the background. A card from a station in the Spanish town of San Sebastian announces that the transmitter is henceforth to be used for Civil War propaganda broadcasts. Another card, from Kiev in Russia, has a picture commemorating the Russian flight over the North Pole.

Russian hams were as keen as any in the world until the outbreak of the Korean War. Then—presumably by order of their government—they ceased to contact hams this side of the Iron Curtain. I still have many

* *Derived from "hamateur."*

A selection from the author's collection of QSL cards

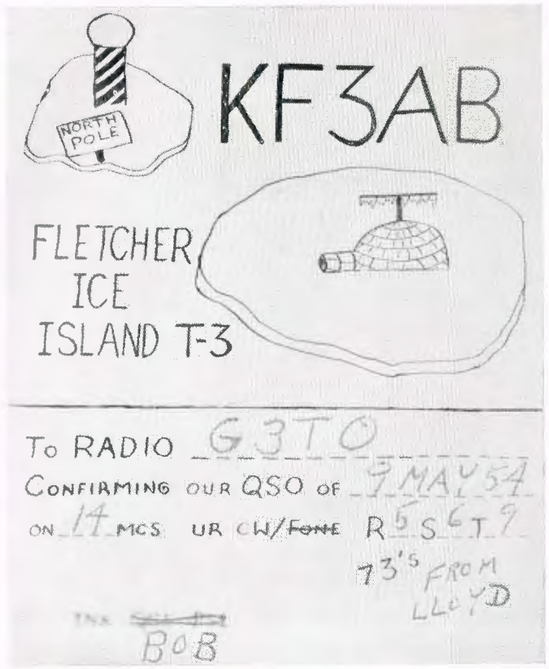
hundreds of Russian cards in my collection, from such places as Leningrad, Moscow, Kazakhstan and Vladivostock. The Russians used the international language of hams, too; as witness a typical card from Stalino saying "TNX, OM, for QSO."

Hams in other Iron Curtain countries are still on the air, oddly enough, and I regularly make contact with Bulgarians and Rumanians. With no common language basis, conversations are carried on in Morse instead of plain language, and are confined to an interchange of formulae from the international Q Code.

Since the war I have made the U.S.A. my speciality. I set out to secure a card from a ham in each of the forty-eight states; I rounded off the collection a year ago, and I now have over 4000 contacts in the States. I have never met one of them in the flesh, but among them I have some very firm friends. My most regular contact is a man in New Jersey. At 1 p.m. (our time—8 a.m for him) every Saturday and Sunday we talk for about half an hour, exchanging news of the weather, our families and recent developments in the ham world. For my usually tolerant wife this is a very trying habit, as it makes me late for Sunday dinner!

A tolerant wife, intending hams are warned, is essential. When conditions are good a ham is apt to stay at his set all night or to get up at 5 a.m. to bandy small-talk with a friend in Alaska. The east coast Americans come in between 10 p.m. and midnight, the Middle Westerners between midnight and 3 a.m., the hams in the Far West between then and breakfast time, and if conditions are good it is tempting to try to have a word with them all.

Americans account for 120,000 of the 200,000 hams in the world, and as you might expect they go at their hobby with typical transatlantic thoroughness. One of the great aims of most hams is to collect a QSL card from every country in the world; but a tiny country like Andorra, sporting not a single ham, might seem to make this impossible. Not a bit of it! A keen American ham will visit Andorra for a week and transmit from there to all his friends, enabling them to add another country to their list. One South American amateur radio association organised an expedition to Easter Island for the same purpose.



A QSL card received by the author from an American survey expedition circling the North Pole on an iceberg

American hams are usually superbly equipped, and many of them send out QSL cards carrying pictures of themselves at their transmitters, surrounded by every piece of equipment but the kitchen sink. One I know of has a transmitter not only in his house, but also in his car and office. In America this may well be of practical use to him, for he would be allowed to call a New York radio network from, say, his car and be connected to a distant telephone subscriber. Here the G.P.O. regulations are stricter, and hams may not even use their sets for passing third-party messages.

The bane of the radio enthusiast is the trough of sunspot activity that occurs every eleven years. We are experiencing such a period now, and conditions on the air are very bad indeed. They will gradually improve over the next five years, when the next sunspot peak should occur. Meanwhile we must make the best of bad conditions.

My own collection of QSL cards now numbers 3000, from 150 countries. The rarest item in it is probably a card from Fletcher's Ice Island—a gigantic iceberg circling the North Pole, from which an American survey expedition recently made some broadcasts. Although I have cards from Fiji, Japan, Greenland and Singapore, I cannot see Andorra or Easter Island coming within my grasp just yet!

I.C.I. NEWS

THE 1955 'TERYLENE' SHOW

MODELS by leading dress designers of London, Paris, Madrid, Rome, Florence, and Dublin, all made of 'Terylene' or 'Terylene' blends, were on view at the 1955 'Terylene' show held at Hutchinson House, London, last month. It was the first time that couturier models from all these countries had been shown in one fashion parade in Britain. There was also a parade of ready-to-wear 'Terylene' clothes by British houses.

The main part of the show, seen by some 5000 trade guests, was a collection of individual exhibits by 130 manufacturers of fabrics and knitted goods. Supporting these exhibits were several features illustrating the development and versatility of 'Terylene' in its two forms of filament yarn and staple fibre. A "cone" exhibit leading visitors to the first floor of the exhibition illustrated some of the main apparel outlets for 'Terylene,' and there were separate displays of half-hose, skirts, lingerie, men's wear and small-wares.

The show was opened by the President of the Board of Trade, the Rt. Hon. Peter Thorneycroft, M.P. He was introduced by Dr. Alexander Fleck, Chairman of I.C.I., who pointed out that this was not strictly an I.C.I. exhibition but that of I.C.I.'s customers and collaborators. "We believe that today we are taking part in an early chapter of what will prove to be a great British success story," said Dr. Fleck; "for we are confident that in due course 'Terylene' will be able to clothe the nation's export figures with credit."

The President of the Board of Trade and Mrs. Thorneycroft, escorted by Dr. Alexander Fleck, arrive at the 'Terylene' Show

Mr. P. C. Allen, I.C.I. Fibres Group Director, explains a point to Mrs. Thorneycroft

Mr. Thorneycroft said that in the 'Terylene' show could be seen the practical application of a very considerable scientific advance. It had been made possible by three groups of people playing their part. These were the scientists, the fashion designers and the industrialists.

"With regard to the scientists, I do think we owe them a word of praise for what they have achieved here. None of us will ever understand the alchemy which can turn the residue of oil refining into the lovely fabrics which we have

Three of the models by leading dress designers which were seen at the 'Terylene' Show. Left: A short evening dress by Givenchy, Paris, in 100% 'Terylene' voile. Centre: A formal evening dress in shell-pink 'Terylene' moiré by Pertegaz of Madrid. Right: Norman Hartnell's Ascot outfit in 100% 'Terylene' all-over lace.

just seen in this room. But behind it all lies the immense and romantic story of research." In the development of the fibre, many men had made a great contribution to our industrial future.

Secondly, the designers had made the most of this new opportunity which had been offered to them and to the fashion trade.

Last, but by no means least, there was the industrialist. Mr. Thorneycroft said he did not think that everyone realised the immense amount of capital which was concerned before an advance of this character could be achieved. Much of that capital had to be expended before the product was finally approved and acclaimed by the public. "That stage," he said, "has been gone through, and we do acclaim those scientists and manufacturers who have been prepared to show enterprise and spirit of adventure to back their cause with capital in order to make this development possible."

I.C.I. AT THE B.I.F.

Seven I.C.I. Divisions and subsidiaries are exhibiting at this year's British Industries Fair.

At Olympia, 'Terylene' Council and the 'Ardil' department of Nobel Division will share a stand, and Lightning Fasteners Ltd. will also have an exhibit.

At Castle Bromwich there will be stands devoted to the products of Metals, Plastics and Nobel Divisions and Marston Excelsior Ltd. Of particular interest on the Metals Division stand is the display of wrought titanium products, with emphasis on applications in the aircraft industry. The new I.C.I. plant for the manufacture of 1500 tons of raw titanium a year will be in full operation by early autumn.

Nobel Division is showing an entirely new range of products based on silicones: silicone oils, resins, rubbers, and miscellaneous products for mould release, foam suppression, waterproofing masonry and textiles, heat-resistant paints, electrical insulation, mouldings and extrusions, and for coating glass and asbestos cloth.

DR. HOLROYD ADDRESSES O.E.E.C. CONFERENCE

Dr. R. Holroyd, Research Director of I.C.I., was one of the speakers at a conference held in London last month to discuss the functions and education of the chemical engineer in Europe.

The conference was organised by the Institution of Chemical Engineers, in co-operation with D.S.I.R., for the European Productivity Agency of the Organisation for European Economic Co-operation. Some 350 delegates from sixteen countries attended. In his paper Dr. Holroyd discussed the various stages in the evolution of an industrial project, from the original conception to the design of the full-scale plant.

At the close of the conference the delegates attended a reception at Imperial Chemical House given by the Chairman and directors of I.C.I.

HEAD OFFICE

Miss A. M. Drew

It was with great regret that her many friends said goodbye to Miss Drew, whose early retirement through ill health took place at the end of March.

Miss Drew joined Central Registry in 1927 and later became a member of the staff of the first Lord Reading when he was president. She was subsequently transferred

Miss A. M. Drew

to the Staff Department, where she became assistant to the Establishment Officer at Nobel House during the war years. At the end of 1946 she was appointed to take charge of the women staff at the Southern Region Office at Gloucester House, and in April 1950 she returned to Head Office to succeed Miss Buist as Supervisor of Women Staff for Head Office and Regions. It is for her work during this last phase of her career that she will be chiefly remembered.

The problems confronting a woman supervisor are many, and can only be solved by the exercise of tact, patience and sound judgment. Miss Drew possessed these qualities to a high degree, and it was for this reason that people at all levels found her so approachable. No tribute to Miss Drew would be complete without reference to her sense of humour, which has enabled her and has helped others to overcome what often appeared to be insurmountable difficulties.

Miss Drew has done a great deal to enable women to play a recognised part in the Company's affairs through her contacts with women supervisors in Divisions and Regions; she has also made her knowledge and experience available to people outside the Company who have sought her advice in their own staff problems.

BILLINGHAM DIVISION

Synthonia's Tribute to Mr. Zealley

Tributes were paid to Mr. A. T. S. Zealley for his work for the Synthonia Club during his long association with it when a presentation was made to him on 22nd March on behalf of members of the club.

Mr. G. Child, chairman of Synthonia Club executive council, presents Mr. Zealley with a barograph on behalf of members of the club

Mr. Zealley has been president for a number of years, and he was present more than thirty years ago when the forerunner of the existing club was opened.

The gift presented to him by Mr. G. Child, chairman of the club executive council, was a barograph, and an amusing touch was that the pen which automatically records the variation in atmospheric pressure had been made to inscribe a large "Z" on the card.

About a hundred people attended the presentation, including representatives of club sections, two former chairmen, two former secretaries, and members of the executive council.

Mr. Child said the club would miss "Z" for the steadfast support and sensible advice he had given over many years, for he had regarded the presidency not merely as a figurehead office but had taken a very lively and active interest in all its affairs.

"We have been fortunate," said Mr. Child, "in having such a person as president because of his great range of associations in public and industrial life. This has given him the facility to advise people and has provided the experience to enable him to play a very large part in the development of the club into the complex organisation it is today."

Mr. Zealley mentioned that he and his wife were present at the opening of the first Synthonia Club around 1921–2 in a small hut which had been made available by the Company.

"On that afternoon," he said, "about 90% of the employees at Billingham—about a hundred people—went to the club for the opening ceremony by Mr. Humphrey, and I remember that Mrs. Humphrey had embroidered a beautiful green flag which was hoisted on that occasion. Soon after that the Quoits Section was formed, and Dr. Slade (one of the Billingham pioneers) threw the first quoit and missed the pit altogether."

New Apprentice School

A new engineering school is to be built at Billingham at a cost of more than £100,000, and it is hoped that it will be ready for use in June 1956.

It is to be built on a site opposite the North Gate, near the Synthonia rifle range, and will provide facilities which will make it possible to extend the scope of the apprentices' training scheme operated in the factory by the Billingham Division Education Department.

Preparatory borings are now being made on the site, and members of the Civil Design Section of Chief Engineer's Department are expected to start work soon on the detail drawings. Scheme drawings have already been made, and these show that the new building will be much larger than the present school, which has been in use since 1946.

The main entrance will open on to a large hall-way, from which a staircase will lead to the supervisors' and instructors' offices on the first floor.

All the other rooms will be on the ground floor and will include two lecture rooms—one of which will be equipped

for the showing of films—an exhibition room, a washroom and a messroom, where films may also be shown.

There will be a room set aside for drawing office training, a large fitting bay, a 50 ft. by 100 ft. machine bay, a production bay equipped with lathes and benches, and another bay, called the handicrafts bay, where there will be welding sets, a small furnace and other equipment.

These facilities will enable the Education Department to give all apprentices longer periods of Engineering School training, and a new training programme has already been prepared.

As the result of a Division board decision that the number of apprentices at Billingham should gradually be

A model made in 'Perspex' by Billingham apprentices showing the layout of the new apprentice school

increased from 350 to 492, more boys are now starting apprenticeships than ever before; the average number in each intake—of which there are three each year—has gone up from 19 to 36.

About 70% of the boys are apprentice fitters, turners, electrical fitters and instrument artificers, and the present school has facilities to give them eight months' instruction before they go into the factory.

The other 30% are boys apprenticed to the "plate trades"—welding, plating and sheet metal working—or as plumbers, joiners, patternmakers, moulders, wagonwrights, bricklayers and blacksmiths.

Success for Synthonia Choir

The Synthonia Male Voice Choir scored their greatest success for many years on 19th March, when they won the event for choirs of less than forty voices at the Darlington Musical Festival. They were awarded the *Northern Echo* Trophy, which was presented to Mr. W. Hall, the conductor, by Mrs. N. R. Barker, Mayoress of Darlington.

Seen below at the staff canteen, where they sang at the Billingham foremen's dinner on 18th March, the choir scored 89 points, the highest marking of the day in the musical events, and missed gaining a distinction certificate by only one point.

They and the other choirs had to sing as a test piece "The Coasts of High Barbary," and the standard of singing was reflected in the final markings. The Chester-le-Street Male Voice Choir, who were second, had only two points less than Synthonia, and the Leadgate Gleemen of Consett, who were third, scored 85 points.

Complimenting the Billingham choir on their performance, Mr. J. Booth, the adjudicator, said they had sung with great gusto and that their dynamic changes had been very well pictured.

Accountancy Clerk is J.P.

Mr. Sydney Duncan, an accountancy clerk who has been in Billingham Accounts Department for over twenty years, is one of the twenty-four new Durham county magistrates whose names were announced recently.

The Synthonia male voice choir, which was awarded the Northern Echo *trophy at Darlington Musical Festival*

A member of the Billingham Urban Council since 1938 and its chairman in 1947–8, Mr. Duncan is well known for his public work. He has been chairman of the Council's Rating Finance and Establishment Committee for the past three years and represents the Council on the Tees-side Industrial Development Board, on the Billingham Accident Prevention Committee, and on the governing boards of several schools.

He is also chairman of the Billingham District Local Association Scouts and Guide Movement and president of the Billingham North End F.C.

DYESTUFFS DIVISION

Queen's Scout

Mr. Terence M. Farrar, an apprentice fitter in the Service Section of Huddersfield Works Engineering Department, has achieved the distinction of becoming a Queen's Scout.

Mr. T. M. Farrar

Terence, who joined the Scout movement as a Wolf Cub, is at present a member of the 32nd Huddersfield (Dalton) Scout Troop. In addition to being a First Class Scout it is also necessary to hold qualifying badges to reach the Queen's Scout class. Terence holds the Bushman's Thong, which incorporates the Pioneer, Camp Warden and Venturer badges, while his other badges are Handyman, Ambulance, Despatch Rider and Fireman.

Proficiency in these subjects not only has a personal value but covers service to others—attributes which make a Queen's Scout a valuable member of the community.

GENERAL CHEMICALS DIVISION

His Hobby is Animal Welfare

More than twenty years ago Mr. William Dobson, an electrician in the Cassel Works Power Department, was faced with the task of finding a home for an unwanted horse. Through the secretary of the National Equine Society he and his mother (who shares his love of animals) were able to send the horse to a home of rest at Carlisle. Since then they have been two of the keenest and hardest-working supporters of animal welfare in the Middlesbrough and Stockton district.

In the last five years alone they have sent 23 animals to good homes. Some of the horses were too old for work and went to Carlisle; others, belonging to people who were leaving the country or to firms turning over to motor transport, were boarded out with local farmers. The farmers work them on their farms under the supervision of the National Equine Society or Animal Defence House, London, and look after them until they are old enough for retirement.

In addition to saving horses and other animals from slaughter, Mr. Dobson finds homes for many dogs, and

Mr. William Dobson with Mary, a retired coal horse

ensures that dogs and cats for which homes cannot be found are humanely destroyed.

One animal for which he could find no home was Tommy, a lively pony. Because of special circumstances he could not be sent to Carlisle, and no one in the Middlesbrough area could take him.

"I was working at the old Salt Works at Port Clarence at the time," says Mr. Dobson, "and I finally managed to get him boarded out on a farm at Saltholme. He has been there ever since, and three or four times a week I go out there to take him carrots and other titbits. He knows me so well that I have only to toot the car horn for him to rush to the fence, and I am about the only person he will allow near him."

Mr. Dobson has been a member of Animal Defence House, London, for twenty-five years and was a member of the National Equine Society for fifteen years.

LIME DIVISION

Mr. F. E. Faulkner

Frank Edward Faulkner joined the Buxton Lime Firms Company (now Lime Division) in April 1920, and his death on 3rd March after a comparatively short illness ended a period of service with Lime Division Engineering Department so far unequalled.

The suddenness of his death made all the more painful

the sense of loss suffered by the colleagues and many friends he had made during his long service with I.C.I., both officially and unofficially.

The greater part of his life was spent in helping to build up from rather scattered and obscure beginnings the modern efficient plants with which the Division is equipped today. His services were, however, not limited to Engineering Department. They were placed cheerfully and willingly at the disposal of all departments and sections of the Division; his wide experience and knowledge, and in particular his memory of past and almost legendary details of the organisation, were always available "off the shelf."

Nor will anybody in Lime Division who knew Frank Faulkner, however slightly, ever forget his vast store of knowledge on all aspects of railway working, which could be said to constitute his hobby.

As head of the Engineering General Services Section his work was invaluable to Lime Division Maintenance, as were his advice and experience to the Division Management Committee. In addition he was an extremely popular member of both the I.C.I. Engineering Standards Sub-committee and of the I.C.I. Lubricants Advisory Committee. These latter activities, and his recent work for the Division Technical Services Section, increased still further his wide circle of friends inside and outside I.C.I. These had been greatly augmented during the last war, when he worked unsparingly on the small but urgent series of contracts undertaken on behalf of various government departments and for other I.C.I. Divisions.

Tributes to his brisk cheerfulness and willing assistance have been received from colleagues within I.C.I. and from his many friends in firms with whom he had dealings extending in some cases over thirty years.

METALS DIVISION

Certificate for Canal Rescue

An enthusiastic member of the Midland Caravan Club, Mr. G. H. Catley (Division Engineering Dept.) is used to adventures. Even he, however, never imagined that his hobby would one day bring him an official testimonial to his gallantry.

Mr. G. H. Catley

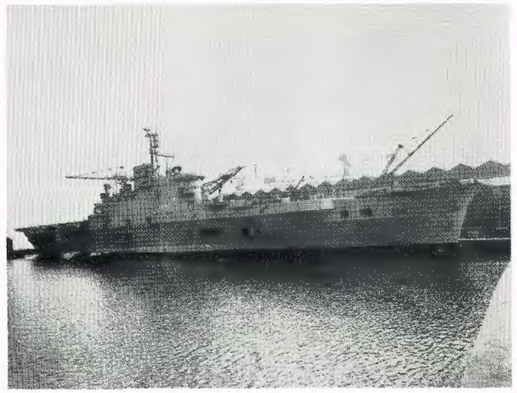
In August of last year Mr. Catley organised a canal cruise for club members. Passing through Smethwick, the party not unnaturally attracted the attention of local small boys, with the almost inevitable result that one unhappy five-year-old found himself in seven feet of water. Mr. Catley happened to be on the bank at the time and dived to the rescue.

He had almost forgotten the incident when, just before Christmas, he had an invitation to attend a meeting of the Smethwick Council and receive from the Mayor a Royal Humane Society testimonial and a personal gift. The testimonial states that Mr. Catley's gallant act undoubtedly saved the boy's life.

Speaking with authority as a rescuer and from experience as a father, Mr. Catley emphasises the good sense of teaching children to swim as early as possible. "Wherever there is water," he says, "children will play. Since no fencing will keep them out of it, the only alternative is proper instruction which will make them safe in it."

A New "Ark Royal"

Metals Division is proud to have supplied for the new H.M.S. *Ark Royal*, the fourth British warship to bear the famous name, all the condenser tubes and plates, all the seawater trunking and all the subsidiary copper service pipes.



H.M.S. Ark Royal

Ark Royal put to sea from Liverpool recently for acceptance trials. This great new aircraft carrier, described as the most formidable fighting unit of the Royal Navy, has been built by Cammell Laird & Co. Ltd. at Birkenhead. More than 800 ft. long, the vessel has an extreme breadth of 112 ft. and a displacement of 36,800 tons. She will carry fifty aircraft and a minimum complement of 1630 officers and ratings.

Wet Weekend

Several departments at Witton are at present dating events as Before or After the Flood, for the weekend 25–28th March, which brought 2·04 in. of rain in 24 hours, was surely among the wettest in Birmingham's history. Typical of the problem facing engineers and production managers was that endured by the Power Station, which generates almost all the power needed on the Witton site.

Just before midnight on Saturday, 26th March, night staff were astounded to find flood water pouring into the basement of the Power Station from the service trenches on the side furthest from the river. When eventually there was time to investigate the cause of the crisis, it was found that the River Tame, which runs alongside the L.M.R. railway line at a point about two miles from the works, had broken its banks; a minor stoppage had diverted the water and turned the railway track into a stream which was flowing into the works sidings, flooding factory buildings 25 ft. above river level, choking the storm drains, and reaching the Power Station via basements and service trenches.

As many of the off-duty staff as could be reached by telephone were called in and by 1 a.m. on Sunday were struggling to dam off the service trenches with sandbags while the works fire brigade, assisted by City Fire Brigade engines, pumped out the basement.

By 3 a.m. the flood had risen to 2 ft. 6 in., submerging the auxiliary pumps and motors; "upstream" of the dam the water had risen to a depth of 6 ft.

By 4 a.m. the flood level was falling slightly, and the Power Station engineers started work on salvaging the electric motors from under the icy water. By noon on Sunday the basement was relatively dry, but after a survey of the damage it was decided that it would be at least two or three days before generation could begin again.

By this time all available staff had been called in, and the success of their efforts may be judged by the fact that the first generator was back in service at 8.30 p.m. Sunday. By 8 a.m. Monday, although things were far from right, the works were able to start the week on full production. Since then one or two of the hurriedly dried out motors have disappeared in a cloud of smoke, but apart from that the situation is pretty well back to normal.

NOBEL DIVISION

£100 *Idea*

An idea submitted by a 38-year-old Ardeer maintenance fitter has led to a considerable increase in the production of detonators.

Mr. Robert Curdie receives a cheque for his bright idea from Dr. W. J. Jenkins

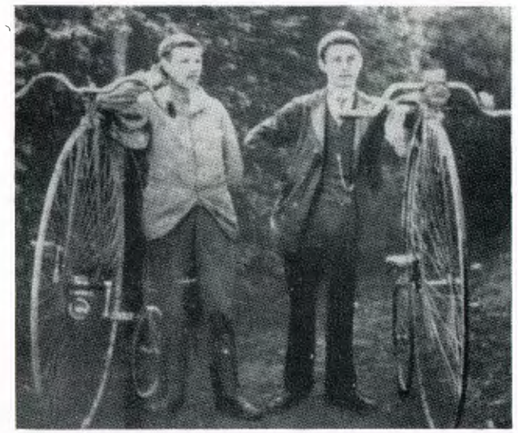
Mr. Robert Curdie's idea has won him £100; an initial award of £25 had already been made when he received a £75 cheque at the Nobel Division Council meeting at Stevenston on 16th March.

Before the adoption of Mr. Curdie's idea it was normal practice, during the insertion of delay elements into detonators, to stop production for about fifteen minutes for the adjustment of the press each time there was a changeover to detonators of a different length. With the number of daily changes involved the total time lost was considerable. Mr. Curdie suggested a way to avoid adjusting the press head; this had certain disadvantages, but after consultations with the experts on the plant, modifications were adopted which have been entirely successful.

Mr. Curdie has been 17 years with I.C.I., mostly in the Detonator Department at Ardeer. Before joining I.C.I. he served his time in the mines, where he went as a boy of 14.

PAINTS DIVISION

Cyclist of the 'Nineties



Stowmarket pensioner Mr. Ernie Wright was looking at an old album of photographs when he came across this one. It was taken 65 years ago, and shows Mr. Wright (right) and a friend resting by the roadside during a run on their penny-farthing cycles from Stonham, near Stowmarket, to Norwich.

Mr. Wright started cycling when he was 16. He was a member of various clubs in London and did a little racing; but mostly he went touring, and on many a Sunday he visited Ripley, Surrey, which in those days was the cyclist's Mecca. There were no tarred roads then, of course, and cycling could be extremely rough.

He has ridden every type of machine, including a triplet. One particular memory of the triplet on which he always had front seat brings a smile to Mr. Wright's face. This machine was used for pacing other cyclists, and on one trip through Richmond he was followed by three tandems and twenty-five singles. Moving at speed, he heard a crack, "felt her tremble," and then finished up in

a heap. "I still have a hole in the top of my head" is how he summarises the injuries received.

With repaired and strengthened forks he was persuaded to pilot the triplet again, and the first trip to regain his nerve was from Westbourne Grove to Bagshot. Mr. Wright says that at times the speed reached on this machine could be very frightening.

The penny-farthing in the picture was not his first one but was really a very high class machine. It was a "Rational," with a 22 in. rear wheel (larger than usual) to eliminate vibration as much as possible. He remembers the front wheel had 84 spokes, the rims were hollow, and the whole machine weighed only 29 lb. Since those early days Mr. Wright has toured most of the English counties with his wife on a tandem. Nowadays, however, he has to be content with pottering around lanes on his old drop-handled bike. He recently handed over to his younger son his "lovely light little Rudge" on which he used to ride to all local meetings.

SALT DIVISION

Bulk Delivery

For many years bulk salt has been carried in open railway wagons and lorries, but the free-flowing nature of dried vacuum salt has made it difficult to carry in conventional vehicles. Recently dried vacuum salt has been transported in vehicles with closed airtight hoppers, which can be discharged by gravity to points directly below the lorry. Now I.C.I. Salt Division has used the free-flowing qualities of this dried salt to develop a system whereby a vehicle carrying salt in bulk can discharge its load directly into bins, even though these are on the ground or at some height above it. This is done by fitting the vehicle with an air discharge system by means of which the salt can be pumped through a pipeline from the lorry to the customer's bin.

The vehicle is a Leyland "Octopus" carrying three spherical aluminium alloy containers, each with a capacity of $3\frac{3}{4}$ tons of salt. New vehicles will probably have two cylindrical containers, each of 6 tons capacity.

Dried vacuum salt is loaded into the vehicle through pipes from overhead silos at the Salt Division's works. The vehicle is fitted with an air compressor driven by its engine. Compressed air can be supplied to each container separately and its contents of salt discharged through a 4 in. diameter flexible hose to a storage bin on the customer's premises. The maximum rate of discharge is 20 tons per hour, but the actual rate will vary with the length of the pipe between the vehicle and the customer's bin and also with the height of the bin above ground level.

This system has been perfected after much experimental work. It has the two advantages of ensuring complete cleanliness of the salt from the time of its manufacture to the time of its use and of eliminating the expense of bags, bag filling and bag handling.

Salt in bulk being loaded into the new vehicle from silos at Weston Point Works

Birdies are Bogey at Sandbach

Mr. Frank Cooke and Mr. Percy Yardley of Salt Division are among the members of the Sandbach Golf Club who have been finding their game unusually expensive lately. At this club a perfectly good drive down the middle of the fairway often ends with angry shouts as the ball disappears, never to be recovered.

The trouble started a few years ago, when a bold crow learned the trick of stealing balls from the course. He taught the trick to his friends and relatives, who adopted it with relish. They now know the length of each player's drive and wait in a convenient tree for the ball to land before swooping down to pick it up. They prefer new balls to old—but nobody knows what they do with them.

The shouts of angry victims alarm other golfers, but not the crows. The ringleader was shot recently by a club member, but the rest of the gang is still at liberty.

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OUR NEXT ISSUE

Our lead for the June issue is the fascinating story of the invention and development of 'Lightning' fasteners, popularly known as the zip. The zip was invented in the United States by Dr. Sundback, and curiously enough, had it not been for a love affair, might never have been invented at all. No less extraordinary is the story of how quite by chance Kynochs were offered the European rights of this brilliant invention.

Our colour feature, appropriately enough, concerns colour—not the manufacturing of colour, but about how colours are not always what they seem. The author is Dr. Vickerstaff of Dyestuffs Division, and the illustrations are ingenious examples of colour deception.

Next is an unusual feature. Miss Atkins of Jealotts Hill is an amateur composer. In a sincere but simple manner she records how she sets about writing music. Here is a most interesting analysis of a mental process that defies logic and reason.

Holiday in France

By Elsie Grant

Illustrated by Martin Aitchison

Good living and good wine, the excitement of a foreign country, and a house of your own shared with friends for three weeks of the summer in Brittany—who would have thought that all this could be enjoyed by seven people for under £18 a head all told?

How many parents, used to Continental expeditions before they left the state of "single blessedness," sigh now to venture abroad but fear the too-heavy costs! These will probably be interested in the following account of a holiday *en famille* in a villa at a French resort.

My husband and I always long to go abroad. In 1949 we snatched a few days on our own in Paris, but the children must have holidays too, and to afford two holidays in these hard times is impossible. For several summers we had answered the family holiday problem by taking a cottage by the sea at an English resort, since hotels are seldom satisfactory with small children.

Last year a friend suggested taking a cottage in France and sharing it between our two families in order to halve costs. We agreed, and put the correspondence in her hands, since her French is excellent. French towns are better provided with holiday information bureaux than English. One writes to the *Syndicat d'Initiative* in any particular town and asks for addresses of house agents. Usually the *Syndicat* forwards the letter to the agents, who in time send particulars of any villas available, with details of conditions and prices.

We had fun out of these lists and descriptions, both in deciphering them and spotting the finer points. We enjoyed many a holiday in anticipation and many jokes on the location of water supplies and W.C.s. We came to know what to look for and what to avoid: *eau de ville*, we found, was much to be desired above *eau de cisterne*, and even the latter preferred to *eau à quelques metres*. Then the sanitary and cooking arrangements had to be scrutinised, and with the aid of a dictionary we learned to avoid the worst evils of drainage that was seldom main. One other difficulty remained. French families, apparently, usually rent seaside villas for three months, and papa goes to and from when he must. Agents were reluctant to consider our one month, but of course we could sub-let.

Finally we did well. We had tried first the Normandy coast, wishing to shorten the travelling, but at last secured a villa at St. Cast, about eighteen miles west of Dinard, to which we could travel by sea from Southampton. For August this was to cost 35,000 francs—something under £9 a week—and we sub-let it for one week to a friend. It had three bedrooms with *vue de mer*, *salle de bain* and *eau courante* on the first floor; *salon*, *salle à manger*, kitchen and lavatory on the ground floor; electric light, gas cooker and garden. There would be no rail journey in France, only a bus from Dinard. We were seven persons—my friend, her husband and child of two years, myself, husband and daughter of four, and the girl aged 17 who usually looks after my daughter.

The fare third class return London–Southampton–St. Malo (or Dinard) was £6 17s. 1d. For children it is best to transfer to first on the boat—an extra 24s. for an adult and 12s. for a child over 3. A berth, obtainable if booked months ahead only, is another 10s. first class or 2s. third.

Arriving at Dinard by vedette from St. Malo after very courteous treatment by the French customs officials, we found by the quay a bus for St. Cast. It

The French bus jibs at nothing . . .

took our seven selves and our eight or nine pieces of luggage (including a camp bed). The driver said he did not know our villa, but he knew the road and would find out its whereabouts and take us there.

A French bus, it seems, jibs at nothing. It will take trunks, bicycles, live chickens and ducks, pigs in sacks and goats. All will be given room on the top of the bus if it is fine, and if it rains the driver will stop, take down all the luggage and stow it somewhere inside at the back or cover it all up with a tarpaulin. If it had been England I would have had visions of being turned off the bus sitting on a mountain of luggage at a street corner while the husbands sought out the villa. As it was, when the bus stopped at the agency in the main street we were told that a car was ready to take us and our luggage to the villa. Our fares from the boat to St. Cast, including tips to the porters and everything, came to about 30s. for the seven of us.

The villa itself was far better than we had dared hope. It was on a road rising from the main street, about six minutes from the sea. It was built up high, with a turreted roof and the air of a *château*. Its rooms were large, airy and lofty, with a real *vue de mer*; its beds were well sprung, comfortable and clean; its china was plentiful and very attractive to our utility-trained eyes; its floors were either polished wood with small rugs or (downstairs) tiled with coloured tiles in a pattern: all very easy to keep clean.

We were to pay 1500 francs on departure for cleaning and certainly we found it clean; the *gardienne* had even washed the blankets and was airing them on our arrival. She proved most useful and told us of the *taxe de séjour* (28 francs per person per day), of a water tax if we used too much water, that we paid for the electricity at the end of the month and for the gas by the cylinder.

Our *gardienne*, we learned, had a cow and would supply us with milk every morning. In this land of smallholdings everyone seemed to have his own cow and pig, and when we asked her the price of cooking fat, or wondered how people could afford to cook in butter at the price, she replied that she never bought these, since she could kill a pig and get butter from her cow: yet she was only a working woman. We later met our cow, a fine healthy one; but actually we always boiled both milk and water for the children.

Plumbing was rather French and far from perfect. There was an elaborate geyser in the bathroom but no gas connected to it: we did not mind that, but over the bath was a shower, which when turned on would not turn off because a washer was gone, and it flooded the floor. The lavatory was of the type with a lid that necessitates jugs of water and great competition not to be the one emptying the jug. But when told of the defects the agency had everything put right, most willingly and politely.

We had a communal housekeeping purse, and each family put in 4000 francs (£4) a week. Thus 8000 francs kept house for five adults and two children reasonably well for a week. My friend and I had planned Continental breakfasts, partly to save trouble and money, partly to capture the atmosphere. In this we failed miserably. The men just would not play: they developed appetites worse than their usual, demanding eggs at least and plenty of fruit.

For our midday meal we had meat or fish, two vegetables or more, a sweet, and always several kinds of cheese, bread, butter and coffee. Meat and butter were dear, 5s. and 6s. a pound, but the cuts of meat were far better than ours, with no bone, gristle or chunks of yellow fat tied on: bones were gratis for soup, and service was courteous. Vegetables were on the whole cheaper than in England, eggs were plentiful at 2s. 3d. or 2s. 6d. a dozen, cheese was cheaper than the same French brands in England—Camembert 1s. 9d., processed Gruyère 1s. 3d. a box, fresh Gruyère 6s. a pound. Tinned stuff, which we did not buy, was mostly very dear, whereas (so much more important!) wine was cheaper, and we found we could buy a bottle every other day out of our housekeeping money.

We rarely had tea English fashion. St. Cast has a glorious sandy beach and we usually stayed out until 6 o'clock, sometimes having a *croissant* on the beach or a *goûter* at the *pâtisserie*. On returning home we had cups of tea and sometimes bread, butter and jam while the children had supper and were put to bed. We all developed colossal appetites and the children, usually pernickety, were always asking for more, and we could provide it without one of the numberless hotel *suppléments*.

Our evening meal we had about eight o'clock, a cooked meal of the same size as lunch. We consumed amazing quantities of bread; the bread is so much nicer than ours, and butter plentiful if dear. Of course we had picnics too and expeditions, eating French bread, delicious *pâté de foie*, cold meat and fruit. On the whole the weather was kind and the sun far hotter than here.

The shop people were very helpful, friendly and honest, and treated us at least as well as their compatriots. We tried two neighbouring markets which were great fun. One could buy anything from an earring to a pig, and although there was more risk of roguery, things were far cheaper than in St. Cast, and the whole was such a stimulating expression of French life, with its peasants arriving in traps, sausages wrapped in *crêpes Bretonnes*, and live ducks for sale.

The holiday, including fares, tips, food, rent and taxes, cost us about £60 per family for three weeks and three days, or £120 for five adults and two children. It gave us a splendid experience, lots of fun and a new insight into French life.

"Swiss Valley"

Photo by George Parker, A.R.P.S. (Metals Division)